

GP 3634

02/12/99  
JCS30 U.S. PTO

PATENT  
Attorney Docket No. 96-007B

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Hoerner, et al.

Group Art Unit: 3634

Serial No. 08/679,411

Examiner: Lev. B

Filed: May 28, 1996

For: Coupling Mechanism and Panel for  
Sectional Door

PETITION FOR THREE-MONTH EXTENSION  
OF TIME UNDER 37 C.F.R. § 1.136(a)

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

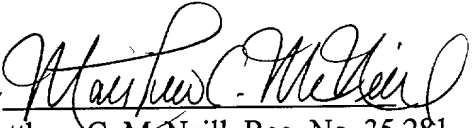
In accordance with the provisions of 37 C.F.R. § 1.136(a), the undersigned attorney, on behalf of applicant(s), hereby petitions for a three-month extension of time to and including 15 February 1999, to file a response to the Office Action of 14 August 1998, which carried an original response date of 14 November 1998.

Authorization is hereby given to charge the \$870 fee to Deposit Account 18-1450. Any additional fee which may be due or any other charges in connection with this application should be charged to Deposit Account No. 18-1450.

Signed at Milwaukee, in the County of Milwaukee and State of Wisconsin, on February 12, 1999.

Respectfully submitted,

RITE-HITE HOLDING CORPORATION

By   
Matthew C. McNeill, Reg. No. 35,281  
Intellectual Property Counsel  
8900 North Arbon Drive, P. O. Box 23043  
Milwaukee, WI 53223-0043  
(414) 362-0610

CERTIFICATE OF MAILING

I hereby certify that this PETITION FOR THREE-MONTH EXTENSION OF TIME UNDER 37 C.F.R. § 1.136(a) is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on February 12, 1999.

12 FEB 99  
(date)

Matthew C. McNeil

GP 3634

02/12/99  
JC530 U.S. PTO

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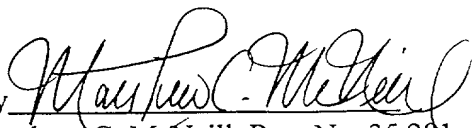
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12 FEB 99  
(date)

Matthew C. McNeill

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**UTILITY  
PATENT APPLICATION  
TRANSMITTAL**

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No. **96-007B2**First Inventor or Application Identifier **Hoerner**Title **Coupling Mechanism and Panel for  
Sectional Door**Express Mail Label No. **E1847855145US****APPLICATION ELEMENTS**

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents  
Box Patent Application  
Washington, DC 20231

1. ☒ \* Fee Transmittal Form (e.g., PTO/SB/17)  
(Submit an original and a duplicate for fee processing)
2. ☒ Specification **Total Pages 18**  
(preferred arrangement set forth below)
- Descriptive title of the invention
  - Cross References to Related Applications
  - Statement Regarding Fed sponsored R & D
  - Reference to Microfiche Appendix
  - Background of the invention
  - Brief Summary of the invention
  - Brief Description of the Drawings (if filed)
  - Detailed Description
  - Claim(s)
  - Abstract of the Disclosure
3. ☒ Drawing(s) (35 U.S.C. 113) **Total Sheets 3**
4. Oath or Declaration **Total Pages 3**
- a. ☐ Newly executed (original or copy)
  - b. ☒ Copy from a prior application (37 C.F.R. § 1.63(d))  
(for continuation/divisional with Box 17 completed)  
[Note Box 5 below]
  - i. ☐ DELETION OF INVENTOR(S)  
Signed statement attached deleting  
inventor(s) named in the prior application,  
see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).
5. ☒ Incorporation By Reference (useable if Box 4b is checked)  
The entire disclosure of the prior application, from which a  
copy of the oath or declaration is supplied under Box 4b, is  
considered to be part of the disclosure of the accompanying  
application and is hereby incorporated by reference therein.

6. ☐ Microfiche Computer Program (Appendix)
7. Nucleotide and/or Amino Acid Sequence Submission  
(if applicable, all necessary)
- a. ☐ Computer Readable Copy
  - b. ☐ Paper Copy (identical to computer copy)
  - c. ☐ Statement verifying identity of above copies

**ACCOMPANYING APPLICATION PARTS**

8. ☐ Assignment Papers (cover sheet & document(s))
9. ☐ 37 C.F.R. § 3.73(b) Statement ☐ Power of Attorney  
(when there is an assignee)
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure ☐ Copies of IDS  
Statement (IDS)/PTO-1449 Citations
12. ☒ Preliminary Amendment
13. ☒ Return Receipt Postcard (MPEP 503)  
(Should be specifically itemized)
14. ☐ \* Small Entity ☐ Statement filed in prior application,  
Statement(s) Status still proper and desired  
(PTO/SB/09-12)
15. ☐ Certified Copy of Priority Document(s)  
(if foreign priority is claimed)
16. ☒ Other: **Certificate of  
Extension and Notice of  
Appeal from Parent case**

**\* NOTE FOR ITEMS 1 & 14: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY  
FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT  
IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).****17. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:**

☐ Continuation ☒ Divisional ☐ Continuation-in-part (CIP) of prior application No: **08 / 679,411**

Prior application information: Examiner **B. Lev** Group / Art Unit: **3634**

**18. CORRESPONDENCE ADDRESS**☐ Customer Number or Bar Code Label

(Insert Customer No. or Attach bar code label here)

or ☒ Correspondence address below

Name	<b>Matthew C. McNeill</b>				
	<b>Rite-Hite Holding Corporation</b>				
Address	<b>8900 North Arbon Drive</b>				
City	<b>Milwaukee</b>	State	<b>WI</b>	Zip Code	<b>53223</b>
Country	<b>USA</b>	Telephone	<b>414 362-0610</b>	Fax	<b>414 355-6578</b>

Name (Print/Type)	<b>Matthew C. McNeill</b>	Registration No. (Attorney/Agent)	<b>35,281</b>
Signature	<i>Matthew C. McNeill</i>	Date	<b>2/12/99</b>

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

A

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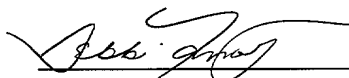
Date of Deposit: February 12, 1999

I hereby certify that the documents listed below are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10 on the date indicated above and is addressed to Box PATENT APPLICATION, Assistant Commissioner of Patents and Trademarks, Washington, DC 20231:

- (1) Utility Application Transmittal (SB/05)
- (2) Fee Transmittal (SB/17)
- (3) Copy of Prior Application
  - 18 pages Specifications
  - 3 pages drawings
  - 3 pages declaration
- (4) Preliminary Amendment
- (5) Copy of Petition for Three-Month Extension of Time from parent case
- (6) Copy of Notice of Appeal from parent case
- (7) Return receipt postcard
- (8) All fees charged to Deposit Account No. 18-1450

Debbi Zanotti

Typed name of person mailing paper or fee



Signature of person mailing paper or fee

**Applicant(s)** Hoerner, et al.

**Title** Coupling Mechanism and Panel for Sectional Door

**Serial No.** \_\_\_\_\_ **Filed:** February 12, 1999

Rite-Hite Holding Corporation  
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Milwaukee, WI 53223-0043

02/12/99  
jc525 U.S. PTO

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Hoerner, et al.

Prior Application  
Group Art Unit: 3636

Parent Application  
Serial No. 08/679,411

Examiner: B. Lev

Parent  
Filed: 05/28/96

For: Coupling Mechanism and Panel for  
Sectional Door

**PRELIMINARY AMENDMENT**

Assistant Commissioner  
for Patents  
Washington, D.C. 20231

Dear Sir:

Prior to the examination of the above-identified patent application, please enter the following amendments and consider the following remarks.

In the Specification:

At page 2, line 1, please insert:

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a divisional of co-pending application Serial No. 08/679,411 filed May 28, 1996.

After page 18, please insert the following ABSTRACT:

ABSTRACT

-- An improved coupling mechanism for adjacent panels of a sectional door, the panels including facing, adjacent edges; the coupling mechanism including at least one recess formed in or disposed adjacent to the facing edge of each panel, and also including at least one pliable hinge member having a body portion, and expanded regions at each end of the body portion, which are received within and movable within the facing recesses to provide for the relative movement between the facing edges of the panels as the door moves between blocking and unblocking positions. --

In the claims:

Please cancel claims 1-16.

Remarks

Note that a Petition for Extension and a Notice of Appeal are being filed concurrently herewith in the parent case. Copies of the Petition and Notice of Appeal are included herein.

Conclusion

In view of the above amendments and remarks, the application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue.




In re 96-007B2  
Serial No. 08/679,411

If in the opinion of the Examiner a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney at (414) 362-0610.

Respectfully submitted,

RITE-HITE HOLDING CORPORATION

By 

Matthew C. McNeill  
Reg. No. 35,281  
8900 North Arbon Drive  
P. O. Box 23043  
Milwaukee, WI 53223-0043  
(414) 362-0610

## **SPECIFICATION**

### **TO ALL WHOM IT MAY CONCERN:**

Be it known that Bill Hoerner, a citizen of the United States of America, and resident at 1935 North Grandview, Dubuque, IA 52001; Tom Jansen, a citizen of the United States of America, and resident at 10186 Dixie Drive, Dubuque, IA 52001; and Perry Knutson, a citizen of the United States of America, and resident at 205 South Polk Street, Lancaster, WI 53813, have invented a certain new and useful Coupling Mechanism and Panel for Sectional door of which the following is a specification.

## FIELD OF THE INVENTION

The invention is directed generally to sectional doors, and more particularly to a hinge and spacer mechanism for coupling adjacent panels in such a door.

## BACKGROUND OF THE INVENTION

Sectional doors are used in a wide variety of industrial, commercial and private settings. A common example of a sectional door is a conventional garage door. Sectional doors typically comprise a series of panels hinged together to form the door, and the door is movable between a range of doorway-blocking positions, in which one or several of the panels extend across the doorway opening, and unblocking positions. A sectional door is most commonly stored in a so-called "overhead" configuration. In such a configuration, a guide track is disposed on either side of the doorway, with one leg (adjacent to the doorway opening) extending vertically along the doorway, and the second leg (projecting back from the doorway opening) disposed above and behind the doorway (i.e., "overhead"). A curved track section joins the two legs. Associated with the panels making up the door are a series of rollers, which are received within and guided by the tracks to guide the panels and thus the door between its blocking and unblocking positions. Sectional doors may also be stored in a vertical orientation directly above the doorway opening. That is they may have straight tracks and be movable in a continuous plane between doorway-blocking and doorway-opening positions. Typically, the panels comprising such a sectional door are formed of either metals, wood, or composite structures either glued or riveted together.

The panels which form a sectional door are commonly coupled to each other by means of hinges disposed between adjacent panels. In overhead storing doors, these hinges are required to allow the panels to pivot with respect to each other so that successive panels

can change their orientation from the vertical to the horizontal, or vice versa, as they move either toward or away from the overhead, stored position. While these hinges are needed for proper door activation, they also have disadvantages. For example, the hinges create spaces or gaps between successive panels the sizes of which change as the door travels, and which may thus become pinch points. While the size of these gaps is typically largest when the two successive panels are adjacent the curved portion of the track, they may be present for other orientations of the door, particularly when the door is near the fully closed position. As the door moves to the fully closed position, the accumulated weight of the door will compress any gaps between successive panels, pinching them together. Such a pinching action may be a hazard either to personnel or to valuable cargo in the vicinity of the door. The gaps between panels also allow air to leak past the door. In refrigerated or other temperature-controlled warehouses or other industrial installations, the leakage through these gaps may be substantial and thus costly. Finally, sectional doors in an industrial environment will be subjected to impacts - typically by fork trucks or other material handling equipment, or by the load which they are carrying. Accordingly, damage may result. If a panel is damaged, the hinges associated with that panel must all be removed and possibly replaced. Further, the panel must then be removed and replaced and the associated hinges re-attached. Such a repair operation may be both time-consuming and costly.

#### SUMMARY OF THE INVENTION

Accordingly, it is the primary aim of the present invention to provide an improved coupling mechanism for the panels of a sectional door as compared to those previously provided.

In accordance with that aim, it is an object of the invention to provide a sectional door coupling mechanism that provides proper door actuation while minimizing potential safety hazards.

It is a further object to provide a coupling mechanism exhibiting improved sealing and leak prevention between adjacent panels.

Another object is to provide a panel coupling mechanism that is easy to implement, and to service in the event of damage to the door.

In accordance with these and other objects of the invention, there is provided an improved coupling mechanism for adjacent panels of a sectional door. The adjacent panels with which the coupling mechanism is associated include facing, adjacent edges. The coupling mechanism includes at least one recess formed in or disposed adjacent to the facing edge of each panel. To allow for relative movement between the edges of the panel, the coupling mechanism also includes at least one pliable hinge member. The hinge member includes a body portion, and expanded regions at each end of the body portion, which are received within and movable within the facing recesses to provide for the relative movement between the facing edges of the panels as the door moves between blocking and unblocking positions. To ensure that a minimum spacing is maintained between the adjacent edges, and to minimize the existence of a pinch point between the panels, at least one spacer member is disposed between the facing edges of the panels.

According to a preferred embodiment of the invention, an endpiece is provided which is disposed on each of the adjacent panels on their facing edges. This endpiece may illustratively be an extrusion, preferably including the recess formed integrally therein, and running the length of the endcap. The pliable hinge member may be a fabric hinge with a

generally flat body, and expanded end regions. The end regions are large enough to prevent them from leaving the recesses once assembled, but are still capable of movement within the recesses to provide for the relative movement between panels needed for door operation.

Each extrusion may also include a spacer member formed integrally thereon.

The embodiments of the invention will be described herein in reference to the appended drawings, wherein:

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a sectional door of the type with which the coupling mechanism of the invention is preferably used, and shown in a door closed position;

Fig. 2 is a perspective view of the sectional door of Fig. 1, and showing the door in an open position;

Fig. 3 is a perspective view showing two adjacent panels coupled together with a coupling mechanism according to an embodiment of the invention;

Fig. 4 is a sectional view of a coupling mechanism according to an embodiment of the invention with the panels in a vertical orientation during movement between blocking and unblocking positions;

Fig. 5 is a sectional view of a coupling mechanism according to an embodiment of the invention with the panels in a vertical orientation, but with the door in a fully-closed position;

Fig. 6 is a sectional view of a coupling mechanism according to an embodiment of the invention with the panels rotated relative to each other, as during movement past the curved portion of a track toward a fully-open position;

Fig. 7 is an exploded view of an exemplary panel according to an aspect of the present invention; and

Fig. 8 is an elevation showing a lateral stop mechanism according to a further aspect of the invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

While the invention will be described in connection with certain preferred embodiments, there is no intent to limit it to those embodiments. On the contrary, the intent is to cover all alternatives, modifications and equivalents as are included within the scope and spirit of the invention as defined by the appended claims.

The coupling mechanism according to the invention will preferably be used in combination with a sectional door, like that shown in Figs 1 and 2. The sectional door 10 is comprised of a series of panels 12 which extend across the door opening (D in Fig. 2) when the door 10 is in a doorway blocking position, such as the fully- closed position shown in Fig. 1. In a conventional manner, door 10 is also movable to unblocking positions, such as the fully-open position of Fig. 2. It will be appreciated that the door 10 has a range of doorway blocking positions in which one or more panels 12 extend across the doorway D. To guide the door between its blocking and unblocking positions, a track 20 is disposed on either side of the doorway D. Since the door 10 in Figs. 1 and 2 is of the overhead-storing configuration, the track 20 includes a first, vertical leg 22, and a second, horizontal leg 23, joined by curved section 24. The panels 12 forming door 10 typically include rollers (not shown) extending from the lateral edges of the panels, and which are received within the track to guide it during travel. Alternatively, the track may be formed such that the ends of the panel may be directly received within the track 20, eliminating the need for rollers. The coupling mechanism according to the invention may be used with either type of door, and with other configurations of sectional doors.

The coupling mechanism according to the invention is used to couple adjacent panels together. Typically, such coupling is performed by a conventional hinge, having a leg attached to each of the panels. The conventional hinge allows the panels to pivot relative to each other so that, for example, successive panels can navigate the curved section of the track 24. The novel coupling mechanism according to the invention provides this same function, but with other attendant advantages. An example of the coupling mechanism according to the invention is illustrated in Fig. 3, showing two adjacent panels in a perspective view. For purposes of illustration, the upper panel will be designated 12a and the lower panel 12b. The two panels 12a,b have adjacent, facing edges 13a and 13b with which the coupling mechanism 30 is associated. In its broadest sense, the coupling mechanism 30 includes a pliable hinge member 35 which couples the facing edges 13a and 13b together. In this embodiment, the hinge member 35 extends the width of the door, although a plurality of spaced hinge members 35 could also be used. The coupling mechanism of the invention also includes recesses 40a,b disposed adjacent the facing edge of the panels, and within which respective ends of the pliable hinge member 35 are received. In this embodiment, the recesses 40 run the entire width of the panels 12. Alternatively, discrete, spaced recesses 40 could be disposed opposite each other in or adjacent to the facing edges 13a and 13b, and be coupled to each other by hinge individual hinge members 35.

To form the recesses 40 in this embodiment, each of the panels 12a,b includes an endcap 41a,b (respectively) in the form of a preferably aluminum extrusion, which is disposed adjacent the facing edges 13a,b of the panels 12a,b. Toward that end, the extrusion forms part of a frame within which other components of the panel are received, as seen in greater detail in the exploded view of Fig. 7, and as will be described in greater detail below.



As best seen in the section views of Figs. 4-6, the extrusions 41a,b are illustratively rectangular tubes, having slots formed in the side thereof which faces the adjacent panel, to provide the recess 40, which in this embodiment includes not only the slot or opening itself, but also the remainder of the interior of the extrusion. The pliable hinge member 35 includes a body portion 36 and opposed ends 37, 38 comprising expanded regions. In this embodiment, the hinge member 35 is formed of a plastic material, preferably a vinyl material with a polyester web reinforcement giving the member 35 the necessary pliability to be bent and straightened repeatedly without undue wear. The expanded regions 37 and 38 in this embodiment, are formed of a pair of rods of the plastic (vinyl) material which extend longitudinally along the body portion 36. Presently, the rods are attached to the body portion 36 by a vinyl weld, although other, stronger attachment means could be used. Further, the body portion 36 and expanded regions 37, 38 could also be unitary.

To allow for relative movement between the facing edges of the panels 12a,b when they are coupled together by the coupling mechanism of the invention, the recesses 40a,b are formed so as to retain the expanded regions of the hinge member 35, while still allowing those expanded regions (and the attached body 36) to move within the recesses 40a,b. This allows the facing edges 13a,b of the panels 12a,b to move toward each other, or move away from each other, or rotate with respect to each other, depending on the forces being applied to the panels. An example of each of these relative movements of the panels can be seen in reference to Figs. 4-6. In Fig. 4, the panels 12a,b are vertically oriented and in motion between doorway-blocking and doorway-unblocking positions. The weight of the lower panel 12b thus pulls downward, separating the panels. Hinge member 35 allows for this, but limits the separation when the two expanded regions 37 and 38 engage on the shoulders of the

respective recesses 40a,b in the extrusions on each panel. As the panels 12a,b reach the fully-closed position of Fig. 1, however, the facing edges of the panels move toward each other. This is caused by the fact that the lower panel 12b will stop moving downwardly before the next higher panel 12a. In the case of the lowermost panels on the door 10, the lowest panel 12 will engage the floor and stop moving downward, while the next higher panel, due to gravity and inertia, will continue downward. Since the lower expanded region 38 of the hinge member 35 is movable within its recess 40b (compare Figs. 4 and 5), the coupling mechanism of the invention provides for lost motion, allowing the upper panel 12a to move toward the lower panel 12b. However, according to a significant aspect of the present invention, a minimum spacing is maintained between the panels. This minimum spacing prevents the facing edges of the panels 13a,b from pinching together, which pinching could present a safety hazard.

To maintain this minimum spacing, the coupling mechanism according to the invention includes a spacer member disposed between the facing edges 13a,b of the panels. The spacing member is clearly shown in Figs. 4 and 5. According to this embodiment of the invention, the spacing member is in the form of a block 50 attached to one of the extrusions, in this case the extrusion 41b on the bottom panel. Accordingly, as the lost motion action of the hinge allows the facing edges of the panels 12 to approach each other, the extrusion attached to the upper panel will engage the stop block 50, thus preventing further closing of the gap between the facing edges.

The coupling mechanism also provides for relative rotational movement between the panels 12a,b, which is required when the panels are in the being guided between vertical and horizontal orientations by the curved portion 24 of the track 20, as seen in Fig. 1. As shown

in Fig. 6, the pliable hinge member body 36 bends while the expanded regions are retained by the shoulders of their respective recesses 40, thereby allowing the necessary rotational movement between the panels.

A detailed, exploded view of panel 12 is shown in Fig. 7, and illustrates advantageous features of the panel according to this embodiment of the invention. The panel 12 of the present embodiment is formed of a frame, comprising the extrusions 41, connected together by at least one weldment, such as 60, to form the frame (see Fig. 7). Blocks of material, illustratively having polystyrene cores 61 sandwiched between extruded polyethylene skin panels 62, 63, are then inserted into the central areas A and B formed by the frame. Side endcaps 64 may then be fitted over the resulting panel, and may include mountings for the rollers associated with the panel. A panel 12 formed in this manner has advantages over other composite sectional door panels. Such panels typically include core layers and skin layers (and sometimes other layers) which are glued, riveted, or bolted together to form the panel. In temperature-cycling situations, the various layers may thermally expand and contract at different rates. This causes relative movement between the layers, placing stress on the attachment mechanism (glue, bolts, rivets) between the layers, and unduly degrading performance and lifetime for the door. In the present panel, the layers are simply held in a frame, rather than being attached together (see Fig. 3). This allows for relative movement between the layers, greatly increasing the panel's performance in variable temperature conditions. Although the coupling mechanism has been described in reference to the embodiment of Figs 1-6, the invention is not so limited. For example, the coupling mechanism of the present invention could be used in combination with other types of panels. For example, a unitary panel, including suitable recesses 40 formed in its facing edges, could

also be used. Alternatively, extrusions like those in the embodiment of Figs. 1-6 could be bolted, screwed, or otherwise affixed to the facing edges of flat, unitary or composite panels to provide the recesses 40 according to the invention. So long as a coupling mechanism for a sectional door includes recesses disposed on facing edges of adjacent panels, a pliable hinge member having expanded end regions disposed within the recesses to provide for relative movement between the facing edges, and a stop member for maintaining a minimum spacing between the facing edges, such a coupling mechanism falls within the scope of the present invention.

Various other features may be advantageously included on a door including a coupling mechanism according to the invention. For example, given that the stop block 50 is intended to hold the respective panels 12 spaced, a gap is always present between the panels. Such a gap, while reducing the possibility for pinching, and having other advantages, may be undesirable from an aesthetic perspective, and may also allow for undue leakage of air or light through the door. The leakage issue would be a particularly sensitive one in an embodiment of the invention where the hinge member was in the form of a series of spaced, pliable hinges, since there would be open spaces between the hinges in a given gap. Accordingly, seals or covers for both the back and front of the gap may be desirable. By the "front" it is intended to mean that part of an overhead storing door that faces up when the door is stored. It is this section of the door that bows outward during travel from blocking to unblocking positions. The "back" of a given gap is thus that part of the gap on the "inside" of the door, which bows inward during travel through the curved portion of the track. Since the back of the gap gets compressed when the door is in this curved portion (see Fig. 6), the seal or cover for the back of the gap must be pliable. Such a seal is shown in Figs. 4-6. The

pliable seal 70 is an elongated blade of material disposed within a seal-receiving recess 72 formed on a panel 12 with which the seal is associated. As with the recess 40 of the coupling mechanism, the seal-receiving recess 72 may either be formed integrally in a panel 12, or may be part of an extrusion or endcap fixed to or forming a panel 12. Alternatively, the blade seal 70 could be affixed adjacent the facing edge of the panel. The pliable seal 70 is disposed such that it covers the gap for all orientations of the respective panels 12. In the vertical orientation, it extends over the gap. As the back of the gap compresses as the panels move along the curved portion of the track, the blade 70 maintains contact with both of the extrusions 41a,b and is bent and compressed thereby (Fig. 6). Thus, with the door in this orientation, the blade seal 70 also serves as a cover to the gap, minimizing the possibility that something will be pinched in the compressing gap.

The seal or cover for the front of the gap need not be pliable, like the blade seal 70. This is due to the fact that the front of the gap bows out during travel in the curved region, and thus the seal is not compressed. The front seal 80 may thus simply be either a pliable or a rigid or semi-rigid piece of material that is fixed adjacent the facing edge of a panel 12, and which extends over the gap that the panel makes with an adjacent panel with the door in a vertical or horizontal orientation.

Another feature of the invention would be advantageous in a sectional door that provides for breakaway. Such a sectional door would include a mechanism for allowing the lateral edges of the panels 12 to separate from the tracks for an undue impact. Such a feature is very advantageous for preventing damage to a sectional door. Once the panels are broken away, however, and with a coupling mechanism like that shown in the embodiment of Figs. 1-7, nothing will prevent the panels from moving laterally with respect to each other. Such

lateral movement may make it difficult to re-insert or re-feed the panel edges and/or the rollers back into the tracks, as the rollers and tracks would be misaligned. To avoid such a problem, the coupling mechanism according to the invention may also include a lateral stop mechanism. Such a lateral stop mechanism is illustrated in Fig. 8. In its simplest form, the lateral stop mechanism comprises a pair of lateral stops 90, 91 attached to the facing edge 13a of the panel facing the panel edge 13b upon which the stop block 50 is mounted. The lateral stops 90, 91 are separated by a distance substantially equal to the width of the stop block 50. Engagement of the stop block 50 with the lateral stops 90, 91 thus prevents relative lateral movement of the panels 12a,b.

An improved coupling mechanism for sectional doors has thus been disclosed. It is simple to implement, as it includes only facing recesses, a pliable hinge member and a stop block, yet it is safe and reliable to operate. Various advantageous features may also be combined with this novel coupling mechanism.

What is claimed is:

1. A mechanism for coupling adjacent panels of a sectional door, the door being movable between blocking and unblocking positions relative to a doorway, with at least one of the panels extending across the doorway with the door in a blocking position, the adjacent panels including facing, adjacent edges, the coupling mechanism comprising:

- at least one recess disposed adjacent the facing edge of each of the panels; and
- at least one pliable hinge member including a body portion, and expanded regions at each end of the body portion, the expanded regions being received within and movable within the facing recesses to provide relative movement between the facing edges of the panels as the door moves between blocking and unblocking positions.

2. The coupling mechanism of claim 1, and including at least one spacer member disposed between the facing edges of the panels, for maintaining a minimum spacing between the facing edges.

3. The coupling mechanism of claim 1, and including extrusions fixed to the facing edges of the panels, the at least one recess disposed adjacent the facing edge of each of the panels being formed in the extrusion on each panel.

4. The coupling mechanism of claim 1, wherein the facing recesses and hinge member extend across the width of the doorway.
5. The coupling mechanism of claim 1, wherein the pliable hinge is formed of a reinforced plastic material.
6. The coupling mechanism of claim 1, wherein a gap is formed between the facing, adjacent panels, and wherein a pliable blade seal is disposed adjacent the gap, the blade seal being pliable so as to bend to cover the gap as the panels are moved between doorway blocking and doorway unblocking positions.
7. The coupling mechanism of claim 6, wherein a front seal is disposed adjacent the gap at a position opposite the blade seal.
8. The coupling mechanism of claim 1, wherein the spacer member is carried on a first of the panels, and wherein at least one lateral stop member is disposed on a second of the panels between the facing edges of the panels, engagement between the stop member and the lateral stop member preventing relative lateral movement between the panels.
9. A sectioned door for movement between blocking and unblocking positions relative to a doorway, the door comprising:



- at least first and second panels, which include facing, adjacent edges, the panels extending across the doorway with the door in a blocking position, each panel including at least one recess in its facing edge; and
- at least one pliable hinge member including a body portion, and expanded regions at each end of the body portion, the expanded regions being received within and movable within the facing recesses to provide relative movement between the facing edges of the panels as the door moves between blocking and unblocking positions.

10. The sectional door of claim 9, and including at least one spacer member disposed between the facing edges of the panels, for maintaining a minimum spacing between the facing edges.

11. The sectional door of claim 9, and including extrusions fixed to the facing edges of the panels, the at least one recess disposed adjacent the facing edge of each of the panels being formed in the extrusion on each panel.

12. The sectional door of claim 9, of wherein the facing recesses and hinge member extend across the width of the doorway.

13. The sectional door of claim 9, wherein the pliable hinge is formed of a reinforced plastic material.

14. The sectional door of claim 9, wherein a gap is formed between the facing, adjacent panels, and wherein a pliable blade seal is disposed adjacent the gap, the blade seal being pliable so as to bend to cover the gap as the panels are moved between doorway blocking and doorway unblocking positions.

15. The sectional door of claim 14, wherein a front seal is disposed adjacent the gap at a position opposite the blade seal.

16. The sectional door of claim 9, wherein the spacer member is carried on a first of the panels, and wherein at least one lateral stop member is disposed on a second of the panels between the facing edges of the panels, engagement between the stop member and the lateral stop member preventing relative lateral movement between the panels.

17. A panel for a sectional door, comprising in combination:

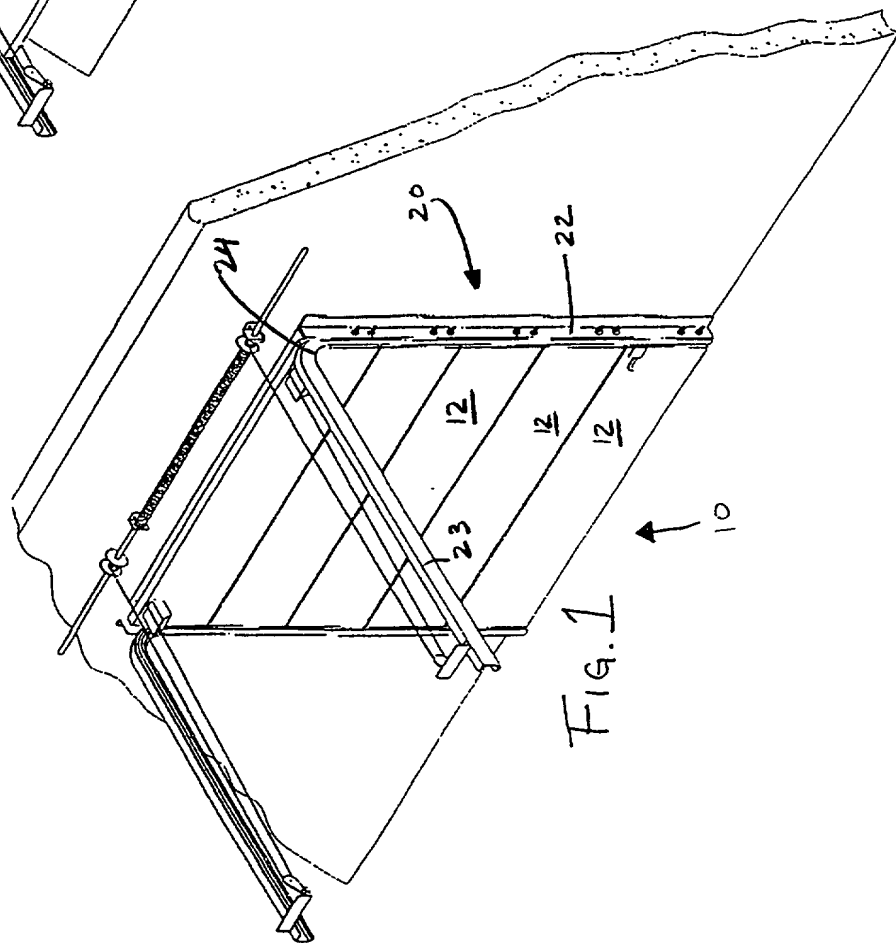
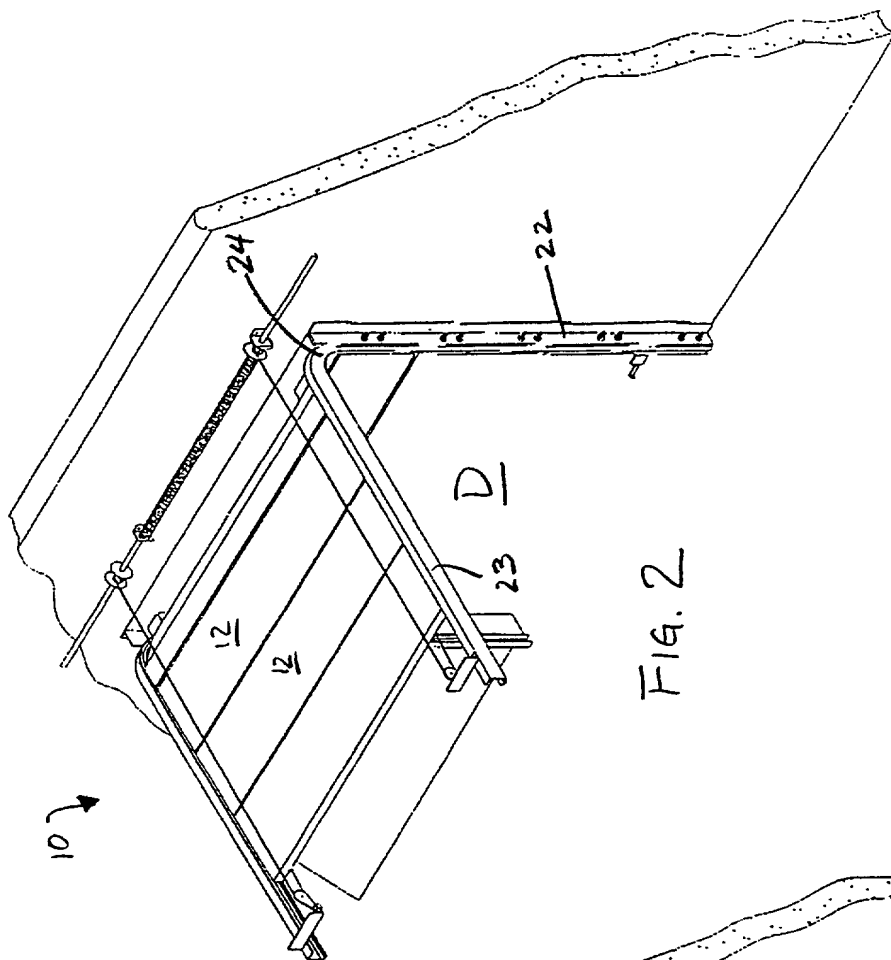
- a frame defining at least one central area; and
- a plurality of material layers, received within the central area of the frame and held in place by the frame, the layers being movable relative to each other.

18. A panel according to claim 17, wherein the frame comprises first and second aluminum extrusions, joined together by at least one weldment.

19. A panel according to claim 18, wherein the layers comprise a polystyrene core sandwiched between polyethylene skin layers.

20. A method for forming a sectional door panel comprising:

- providing a frame defining at least one central area; and
- inserting layers of material into the central area to be held by the frame, and to provide relative movement between the layers.



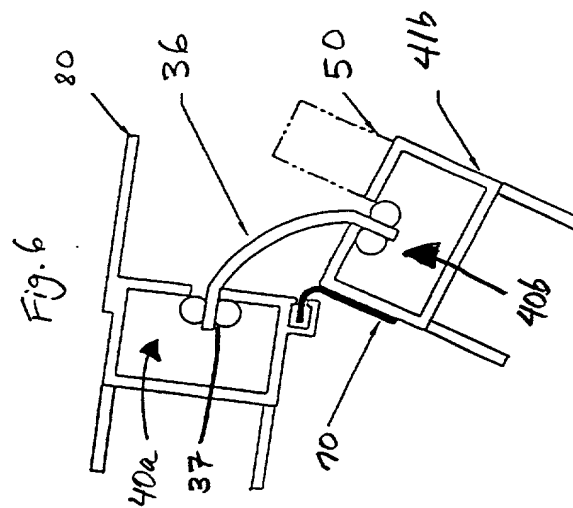
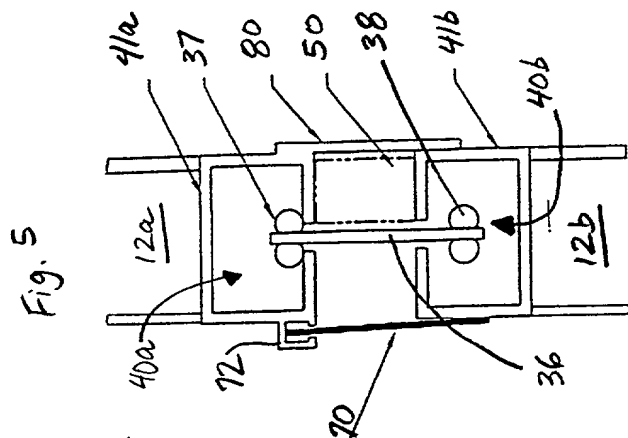
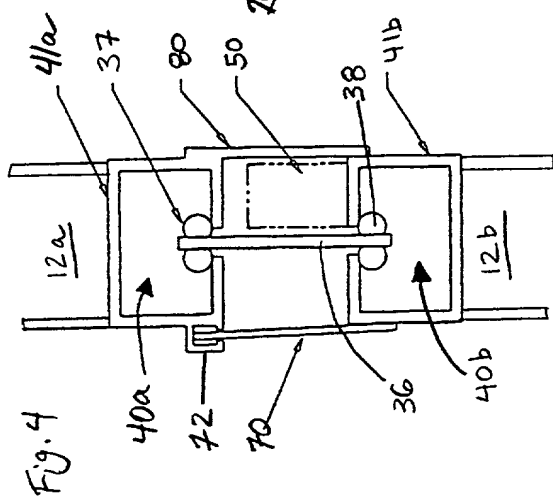
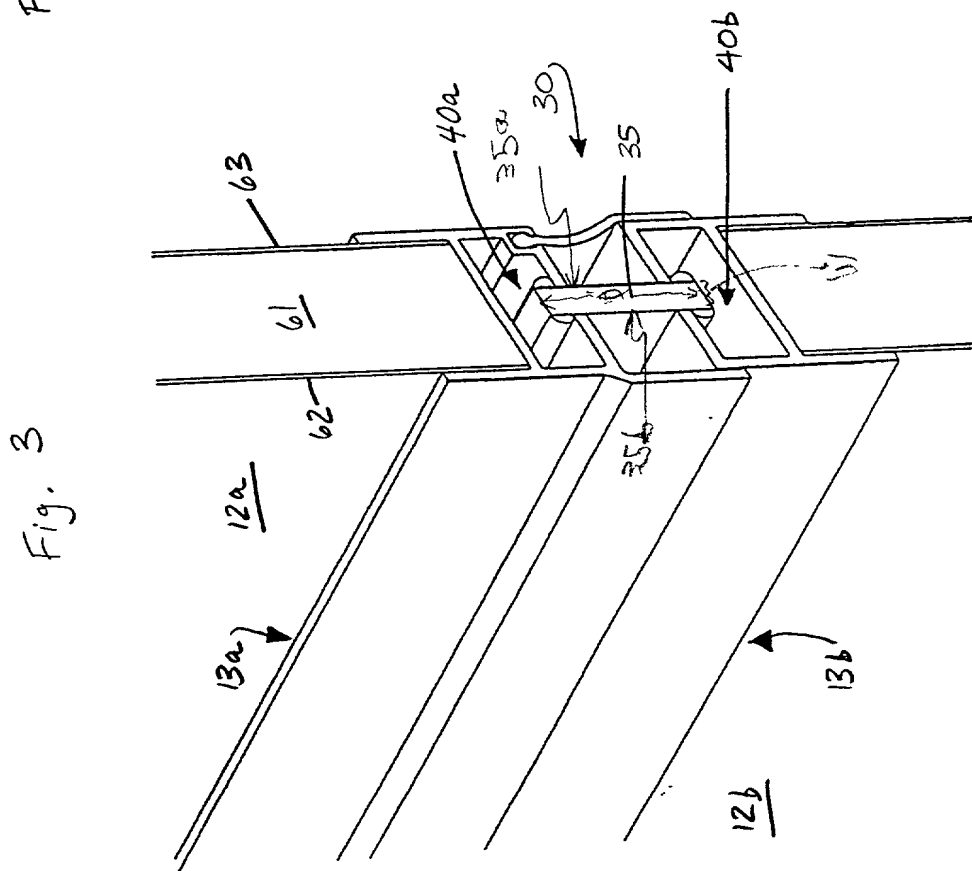


Fig. 4

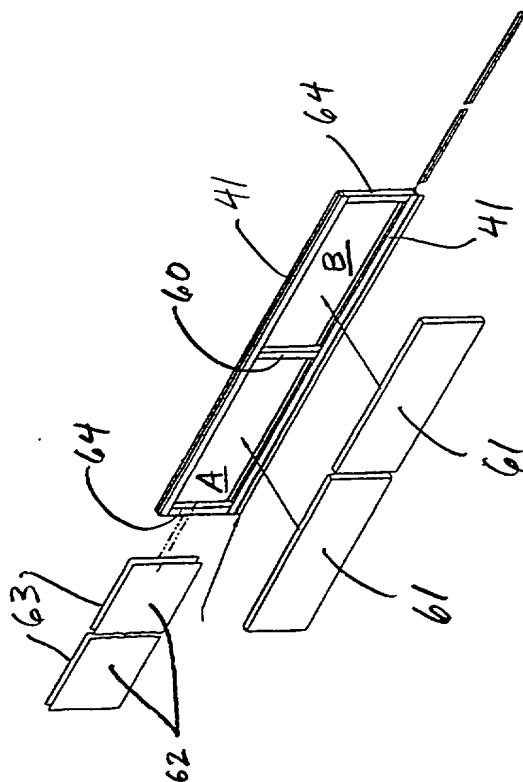
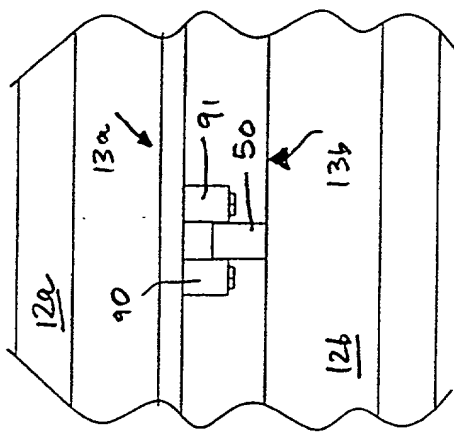


Fig. 8



COMBINED DECLARATION AND POWER OF ATTORNEY

As below named inventor, I hereby declare that

This declaration is of the following type:

- ☒ original ☐ design ☐ supplemental  
☐ national stage of PCT  
☐ divisional ☐ continuation ☐ continuation-in-part

My residence, post office address, and citizenship are as stated below next to my name. I believe I am the original, first, and sole inventor (*if only one name is listed below*) or an original, first, and joint inventor (*if plural names are listed below*) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Coupling Mechanism and Panel for Sectional Door

the specification of which:

- ☒ is attached hereto.  
☐ was filed on \_\_\_\_\_ as Serial No. \_\_\_\_\_, and  
was amended on \_\_\_\_\_ (*if applicable*).  
☐ was filed on \_\_\_\_\_ by Express Mail No. \_\_\_\_\_, as  
Serial No. not known yet, and was amended on \_\_\_\_\_ (*if applicable*).  
☐ was described and claimed in PCT International Application No. \_\_\_\_\_ filed on  
\_\_\_\_\_ and as amended under PCT Article 19 on \_\_\_\_\_ (*if any*).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designated at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

COUNTRY	APPLICATION	DATE OF FILING (day,month,year)	PRIORITY CLAIMED UNDER 37 USC 119			
				YES		NO
				YES		NO
				YES		NO
				YES		NO

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application.

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 USC 120				
U.S. APPLICATIONS		Status (check one)		
U.S. APPLICATIONS	U.S. FILING DATE	PATENTED	PENDING	ABANDONED
1. 0 /				
2. 0 /				
3. 0 /				

PCT APPLICATIONS DESIGNATING THE U.S.			Status (check one)		
PCT APPLICATION No.	PCT FILING DATE	U.S. SERIAL NOS. ASSIGNED (if any)			
4.					
5.					
6.					

DETAILS OF FOREIGN APPLICATION FROM WHICH PRIORITY CLAIMED UNDER 35 USC 119 FOR ABOVE LISTED U.S./PCT APPLICATIONS				
ABOVE APPLN. NO.	COUNTRY	APPLICATION NO.	DATE OF FILING (day, month, yr)	DATE OF ISSUE (day, month, yr)
1.				
2.				
3.				
4.				
5.				
6.				



As a named inventor, I hereby appoint Matthew C. McNeill, Reg. No. 35,281, as my agent and/or attorney to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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